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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

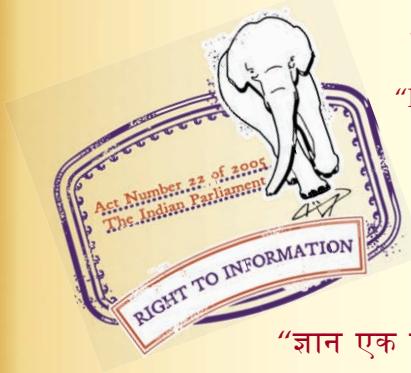
“Step Out From the Old to the New”

IS 10002 (1981): Performance Requirements for Constant Speed Compression Ignition (Diesel) Engines for General Purposes (Above 20 kW) [TED 2: Automotive Primemovers]

“ज्ञान से एक नये भारत का निर्माण”

Satyanaaranay Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

SPECIFICATION FOR PERFORMANCE REQUIREMENTS FOR CONSTANT SPEED COMPRESSION IGNITION (DIESEL) ENGINES FOR GENERAL PURPOSES (ABOVE 20 kW)

1. Scope — Lays down the performance requirements of constant speed compression ignition (diesel) engines for general purposes of ratings above 20 kW.

1.1 This standard covers engines of both IS Rating A and IS Rating B.

1.2 This standard is not applicable to:

- a) Pressure-charged engines,
- b) Engines for ship propulsion or marine auxiliaries,
- c) Engines for aircraft propulsion or aircraft auxiliaries, and
- d) Engines for rail or road traction.

2. Definitions — Given in IS:10000 (Part I)-1980 'Methods of tests for internal combustion engines: Part I Glossary of terms relating to test methods' shall apply.

3. Tests — Shall be carried out to determine the performance of the engine. The tests may be carried out at the ambient conditions and the power and the specific fuel consumption determined during the tests shall be adjusted by using adjustment factors given in IS:10000 (Part IV)-1980 'Methods of tests for internal combustion engines: Part IV Declarations of power, efficiency, fuel consumption and lubricating oil consumption', if the ambient conditions are different from the standard reference conditions specified in IS:10000 (Part II)-1980 'Methods of tests for internal combustion engines: Part II Standard reference conditions'. For determining the performance, the following tests shall be carried out.

3.1 Type Tests — Shall be carried out on engines when first offered for testing and shall also be carried out when there is any significant change in design of the engine or change of any of critical components listed in IS:10000 (Part V)-1980 'Methods of tests for internal combustion engines: Part V Preparation for tests and measurements for wear'. Type tests shall include:

- a) Preparation for tests according to Section I of IS:10000 (Part V)-1980,
- b) Preliminary run according to Section I of IS:10000 (Part V)-1980,
- c) Initial performance test according to Section I of IS:10000 (Part VIII)-1980 'Methods of tests for internal combustion engines: Part VIII Performance tests' (Select test cycle for type of rating — A or B),
- d) Governing tests according to IS:10000 (Part VII)-1980 'Methods of tests for internal combustion engines: Part VII Governing tests for constant speed engines and selection of engines for use with electrical generators',
- e) Endurance test according to Section I of IS:10000 (Part IX)-1980 'Methods of tests for internal combustion engines: Part IX Endurance tests' (select test cycle for type of Rating A or B),
- f) Governing test according to IS:10000 (Part VII)-1980,
- g) Final performance test according to Section I of IS:10000 (Part VIII)-1980 (select the test cycle for type of Rating A or B)
- h) Final inspection test according to Section I of IS:10000 (Part VI)-1980 'Methods of tests for internal combustion engines: Part VI Recording of test results'.

3.1.1 In case any of the declared parameters, that is, specific fuel consumption, power and speed is changed, such a change shall also constitute a significant change and shall entail retype testing of the engine.

Note—In case the same engine is offered for type approval under different constant speed ratings, the type test shall be carried out according to 3.1 for the maximum rated power at the maximum offered speed. However, initial performance test, governing test before and after endurance test and final performance test shall be carried out for all the ratings offered. The endurance test shall be carried out for the type of IS rating. (A or B according to IS:10000 (Part IX)-1980 for the maximum rating declared. The various ratings shall be shown in the form of performance curves according to IS:10000 (Part VI)-1980.

3.2 Fuel Consumption Test—Fuel consumption shall be measured at the beginning of the endurance test and during the final performance test. It shall be declared according to Section I of IS:10000 (Part IV)-1980.

3.3 Determination of Power—Power of the engine shall be determined during the final performance test and shall be declared according to Section I of IS:10000 (Part IV)-1980.

3.4 Mechanical efficiency shall be determined by the suitable method during the type test specified in Section I of IS:10000 (Part IV)-1980.

3.5 Lubricating oil consumption shall be measured according to IS:10000 (Part IV)-1980.

3.6 After the engines have been type tested and approved, the engines of similar design shall be subjected to the following performance tests:

3.6.1 Initial performance test including 12 hour rating test, governing test and fuel consumption test according to Section I of IS:10000 (Part VIII)-1980.

3.6.2 Power determination (see 3.3).

3.6.3 Lubricating oil consumption according to IS:10000 (Part IV)-1980.

4. Performance Requirements of Engines

4.1 Power—The power of the engine shall be declared in kilowatts (kW). The recommended preferred ratings in kW are:

20	45	100	224	500, etc
22.4	50	112	250	
25	56	125	280	
28	63	140	315	
31.5	71	160	355	
35.5	80	180	400	
40	90	200	450	

4.1.1 The power determined in 3.3 shall not be less than one percent of the declared value from the declared value.

4.2 Specific Fuel Consumption (SFC)—Shall be declared by the manufacturer and measured during the initial performance test. It shall conform to the values given in 4.2.1.

4.2.1 The SFC for different speed range of engines shall be as follows:

Rated Engine Speed (rev/min)	SFC, Max	
	As on 1 January 1981 (g/kwh)	As on 1 January 1984 (g/kwh)
Up to 500	350	332.5
Above 500 up to 1 000	290	275.5
Above 1 000 up to 2 000	265	251.75
Above 2 000	325	308.75

4.2.2 The SFC of the engine after the endurance test specified in Section I of IS:10000 (Part IX)-1980 shall not increase by more than 5 percent of the value obtained after the initial performance test specified in Section I of IS:10000 (Part VIII)-1980.

4.3 Lubricating Oil Consumption — Lubricating oil used shall conform with the manufacturers' recommendations. The lubricating oil consumption shall be declared by the manufacturer. The lubricating oil consumption determined shall be within ± 10 percent of the declared value from the declared value.

5. Test Results — Shall be recorded according to Section I of IS : 10000 (Part VI)-1980. Performance curves according to IS : 10000 (Part VI)-1980 shall also be plotted.

6. Information for Inquiry or Order and Information to be Supplied by the Manufacturer — Shall be according to IS : 10000 (Part XI)-1980 'Methods of tests for internal combustion engines: Part XI Information required with the inquiry or order and information supplied by the manufacturer with the engine'.

7. Marking — The engines shall be clearly marked with the following:

- a) Rated output in kW,
- b) Type of rating — IS Rating A or IS Rating B,
- c) Class of governing,
- d) Fuel and lubricating oil specification, and
- e) Manufacturer's name or trade-mark and code No.

7.1 Certification Marking — Details available with the Bureau of Indian Standards.

8. Test Certificates — Shall be provided by the testing authority to the manufacturer, in the *pro forma* given in IS : 10000 (Part XII)-1980 'Methods of tests for internal combustion engines: Part XII Test certificates'.

9. Packing — The engines shall be suitably crated so as to avoid damage during transit.

E X P L A N A T O R Y N O T E

The testing and performance of constant speed and variable speed internal combustion engines was earlier covered by the following Indian Standards:

- IS : 1600-1960 Code for type testing of constant speed internal combustion engines for general purposes
- IS : 1601-1960 Performance of constant speed internal combustion engines for general purposes
- IS : 1602-1960 Code for type testing of variable speed internal combustion engines for automotive purposes
- IS : 1603-1960 Performance of variable speed internal combustion engines for automotive purposes

These standards were originally issued in 1960. As a result of implementation of these standards by the manufacturers and testing laboratories, as also the operation of ISI Certification Marking Scheme, they have now been extensively revised.

While IS : 1600 and IS : 1602 covered the codes for type testing of constant and variable speed engines respectively, the performance requirements of such engines were covered by IS : 1601 and IS : 1603 respectively. These standards are replaced by two sets of standards, one set covers the methods of testing of engines and the other covers the specification and performance requirements of both constant speed and variable speed engines.

The standard covering methods of test is being published in following 12 parts (each part covering a particular test method or information related to methods of tests):

- IS : 10000 Methods of tests for internal combustion engines:
 - Part I Glossary of terms relating to test methods
 - Part II Standard reference conditions
 - Part III Measurement for testing — units and limits of accuracy
 - Part IV Declarations of power, efficiency, fuel consumption and lubricating oil consumption
 - Part V Preparation for tests and measurements for wear

Part VI Recording of test results

Part VII Governing tests for constant speed engines and selection of engines for use with electrical generators

Part VIII Performance tests

Part IX Endurance tests

Part X Tests for smoke levels, limits and corrections for smoke levels for variable speed engines

Part XI Information required with inquiry or order and information supplied by the manufacturer with the engine

Part XII Test certificates

IS : 10000 (Part I to XII) will be complementary to specifications for performance requirements of different types of engines covered by the following standards:

IS : 10001 Specification for performance requirements for constant speed compression ignition (diesel) engines for general purposes (up to 20 kW)

IS : 10002 Specification for performance requirements for constant speed compression ignition (diesel) engines for general purposes (above 20 kW)

IS : 10003 Specification for performance requirements for variable speed compression ignition (diesel) engines for automotive purposes

IS : 10004 Specification for performance requirements for variable speed spark ignition engines for automotive purposes

Spark ignition engines for sprayers and similar applications have been covered by IS : 7347-1974 'Specification for performance requirements of small size spark ignition engines for sprayers'.

Two-stroke spark ignition engines for automotive applications which were earlier covered by IS : 1603 will be covered by a separate specification.

This standard, that is, IS : 10002 has been evolved to help the user to quote the power, specific fuel consumption, lubricating oil consumption, etc, for ordering purposes. On the other hand, it would be useful for the manufacturer to declare the performance of his engine. This standard would be mainly applicable for diesel generating sets and other allied fields. The engines for this purpose are expected to be rated for IS Rating A as there is bound to be occasional overloading. For some applications engines may be rated for IS Rating B.

In this standard certain preferred power ratings according to R 20 series (and R 20/2, R 20/3, R 20/4, R 20/6 derived series) have been included as it was found that the engines presently manufactured tended to fall in line with this series. It is desirable that the manufacturers declare the power of their engines from one of the preferred values.

This standard requires that various classes of engines have the specific fuel consumption (SFC) values as laid down. While laying down these values the committee has taken cognizance of the capabilities of the engines manufactured in India at present. In view of the need to conserve fuel and to improve the efficiency of diesel engines, the committee has desired that SFC values should be improved and has laid down the values that the engines are expected to meet after 1 January 1984. In arriving at these values the committee has envisaged a 5 percent improvement and these values will be further reduced in case there is evidence that this can be done.

IS : 10001 and IS : 10002 replace IS : 1601 for diesel engines up to 20 kW and above 20 kW, respectively. The category of spark ignition engines for general purposes is not being covered as these types of engines are getting extinct due to high fuel costs.

AMENDMENT NO. 1 MAY 1999
TO
**IS 10002 : 1981 SPECIFICATION FOR
PERFORMANCE REQUIREMENTS FOR CONSTANT
SPEED COMPRESSION IGNITION (DIESEL) ENGINES
FOR GENERAL PURPOSES (ABOVE 20 kW)**

(*Page 2, clause 4.1.1*) — Substitute the following for the existing:

'4.1.1 The power determined in 3.3 shall not be less than 97 percent of the declared value.'

(*Page 2, clause 4.2*) — Substitute the following for the existing:

'4.2 Specific Fuel Consumption (SFC) — Of engines varies with speed and type of fuel injection and shall have the following values:

<i>Rated Engine Speed (rev/min)</i>	<i>SFC, Max (g/kWh)</i>	
	Direct Injection	Indirect Injection
Up to 1 000	276	303
Above 1 000 up to 2 000	252	277
Above 2 000	309	340

(*Page 2, clause 4.2.1*) — Delete.

(HMD 19)